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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/763,112

01/21/2004

David Tyvoll

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EXAMINER

HAGEMAN, MARK

ART UNIT

PAPER NUMBER

3653

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/24/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/763,112

Applicant(s)

TYVOLL ET AL.

Examiner

Mark Hageman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 November 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 10,13 and 21-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 12, 14-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,838,056 to Foster. Foster discloses a channel structure defining first and second channels (c3 lines 60+) that extend adjacent one another and between respective pair of opposing ends (figure 3) of the first and second channels, the channel structure further defining a transverse channel that connects the first channel to the second channel intermediate the pair of opposing ends of each channel (108), a first transport mechanism configured to send respective first and second streams through the first and second channels, the first stream including the first particles and one or more second particles (c4 lines 30+), and a second transport (90, 92) configured to selectively move at least one of the second particles from the first stream to the second stream via the transverse channel (c4 lines 65+).

-Re claim 18, Foster further discloses the channel structure includes a substrate (94) and a plurality of thin film electrical devices (90, 92) formed on the substrate).

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-Re claim 19, Foster further discloses the first particles and the one or more second particles are different types of cells (c3 lines 59+).

-Re claim 20, Foster further inherently discloses the first follows a path and wherein the second transport mechanism is configured to apply a transient pressure pulse to the first stream and transverse to the path. Examiner contends that actuation of the MEMS gates 90, 92 etc. will inherently apply a transient pressure pulse to the first stream and transverse to the path.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4-7, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0027225 to Wada et al in view of US 4,216,477 to Matsuda et al. Wada discloses, a channel structure defining a channel having an inlet and first and second outlets (figure 5a);

a first transport mechanism (501 and para 61 lines 2+) configured to create a particle stream of first particles and one or more second particles (figure 5a), each

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particle traveling along the channel from the inlet toward the first outlet and disposed in a fluid (figure 5a and para 62 lines 10+) supported by the channel structure; and

a second transport mechanism (502, 503, 505 and para 61 lines 2+) configured to be pulse activated to selectively move at least one of the second particles from the particle stream and toward the second outlet (para 62 lines 3+)

wherein the channel structure defines a passage disposed in fluid communication with the channel and generally opposing the second outlet (adjacent 502 and 505 in figure 5a). Wada does not disclose the passage includes a fluid diode configured to restrict backflow created by operation of the second transport mechanism. Matasuda discloses a fluid diode (10) disposed in a passage for the purpose of providing great impedance ratio for the transient flow of liquid (c5 lines 22+).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have modified Wada to include the passage includes a fluid diode configured to restrict backflow created by operation of the second transport mechanism, as taught by Matsuda, for the purpose of providing great impedance ratio for the transient flow of liquid and preventing unwanted backflow into reservoirs 503 and 505.

-Re claim 4, Wada discloses, wherein the first transport mechanism is configured to create a flow of the fluid through the channel, and wherein the flow of the fluid creates the particle stream (figure 5a).

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-Re claim 5, Wada inherently discloses, wherein the first transport mechanism is configured to produce a pressure drop along the channel.

-Re claim 6, Wada discloses, wherein the channel structure is configured so that the particle stream follows a path from the inlet to the first outlet without operation of the second transport mechanism (para 62 lines 3+), and wherein the second transport mechanism is configured to exert pressure pulses directed transverse to the path (para 62 lines 13+).

-Re claim 7, Wada discloses, wherein one of the pressure pulses is configured to move a fraction of the fluid from the path, the fraction including the at least one second particle (para 62 lines 13+).

-Re claim 9, Wada discloses, wherein the channel is a first channel and the inlet is a first inlet (figure 5a), the channel structure defining a second channel (510) adjacent to the first channel and configured to carry another fluid from a second inlet (502, 503, 505) to a third outlet (figure 5a), and wherein the second outlet (figure 5a) of the first channel places the first channel in fluid communication with the second channel (branch in figure 5a).

-Re claim 11, Wada discloses, an optical sensor (para 62 lines 10+) configured to sense the at least one second particle in the particle stream, the optical sensor being

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coupled to the second transport mechanism so that sensing the at least one second particle actuates the second transport mechanism (para 62 lines 12+).

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada in view of Matsuda as applied to claims 1, 4-7, 9 and 11 above, and further in view of US 6,838,056 to Foster et al. Wada further discloses a substrate (para 29 lines 10+) and fluid barrier (para 0026 lines 7+) Wada in view of Matsuda fails to disclose a plurality of thin film electrical devices formed on the substrate and wherein the second transport mechanism is included in the thin film electrical devices. Wada in view of Matsuda also fails to disclose the thin film electrical devices are disposed between the substrate and the fluid barrier. Foster discloses a plurality of thin film electrical devices (92) formed on the substrate and wherein the second transport mechanism is included in the thin film electrical devices (90, 92) and that the thin-film electrical devices are disposed between the substrate and the fluid barrier (80, 86, 94) for the purposes of creating a separation device that solves the throughput, cost and disposability issues (c3 lines 12-15) and to provide a barrier to the fluid mixture and an optically transparent element which allows fluorescent signals to leave (C 4 lines 35-38) respectively.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have modified Wada in view of Matsuda to include the thin film electrical devices and their location between the substrate and the fluid barrier, as taught by Foster, for the purposes of creating a separation device that solves the throughput, cost and disposability issues (c3 lines 12-15) and to provide a barrier to the

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fluid mixture and an optically transparent element which allows fluorescent signals to leave (C 4 lines 35-38) respectively.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wada in view of Matsuda as applied to claims 1, 4-7, 9 and 11 above, and further in view of US 6,811,133 to Miles. Wada in view of Matsuda discloses all the limitations of the claim except wherein the second transport mechanism includes at least one of a heater and a piezoelectric element. Miles disclose the use of piezoelectric thin film elements (c2 lines 52+) as MEMS actuators in micro fluidic systems (c3 lines 37+) with the advantage of lower power consumption (c3 lines 59+).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have modified Wada in view of Matsuda to include the second transport mechanism including at least one of a heater and a piezoelectric element, as taught by Miles, for the purposes of providing a lower power consumption actuator.

7. Claims 12 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,808,075 to Bohm et al in view of US 6,811,133 to Miles. Bohm discloses, a channel structure defining a channel having an inlet and first and second outlets (16, 22a, 22b figure 1); a first transport mechanism configured to move first particles and one or more second particles in the channel from the inlet toward the first outlet (12), the first particles and one or more second particles being disposed in a fluid (C3 lines 30-32); and a second transport mechanism (100a) configured to apply a transient



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pressure pulse on the fluid so that at least one of the second particles is selectively moved toward the second outlet (C5 lines 7-12). Bohm does not disclose wherein the second transport mechanism includes a thin-film heater element, a thin-film piezoelectric element, or both. Miles disclose the use of piezoelectric thin film elements (c2 lines 52+) as MEMS actuators in micro fluidic systems (c3 lines 37+) with the advantage of lower power consumption (c3 lines 59+).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have modified Bohm, to include the second transport mechanism includes a thin-film heater element, a thin-film piezoelectric element, or both, as taught by Miles, for the purposes of providing a lower power consumption actuator.

-Re claim 14, Bohm discloses, wherein the first transport mechanism is configured to create a flow of the fluid through the channel, and wherein the flow of the fluid carries the first particles and one or more second particles (C3 lines 29-31).

-Re claim 15, Bohm discloses, wherein the second transport mechanism is configured to apply the transient pressure pulse to a segment of the fluid in which the at least one second particle is disposed (C5 lines 10-12).

-Re claim 16, Bohm discloses, wherein the channel structure is configured so that the first particles and one or more second particles follow a path from the inlet to

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the first outlet without operation of the second transport mechanism (C5 lines 8-9), and wherein the transient pressure pulse is directed transverse to the path (C3 lines 42-43 and figure 100a figure 1).

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-9, 11, 12, 14-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Hageman whose telephone number is (571) 272-3027. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Mackey can be reached on (571) 272-6916. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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